LIFESTYLE MATERIAL FOOTPRINT

An explanation

cscp wbcsd

What is the lifestyle material footprint?

Tool to measure the resource use over the complete life-cycle of products, services and activities that shape lifestyles, e.g. food consumption and mobility patterns.

It can be applied in different scales, from individual lifestyle material footprints to the average material footprint per capita in a country.

It is expressed in mass units, such as kilogram, measured per year, and accounts for both resources used economically and unused extraction.

Why does Your company need it?

The lifestyle material footprint allows us to:

- Measure the amount of resource consumption resulting from our lifestyles;
- Identify the most pressing sustainability impact areas, called ‘hotspots’, arising from the way we live;
- Compare the sustainability performance between different lifestyle areas, products, services and activities;
- Prioritise areas where business improvements and innovations will be most significant to enable sustainable lifestyles;
- Measure how far business solutions can take us in achieving sustainable living and initiate transformation towards sustainability;
- Easily communicate lifestyle impacts and sustainable business opportunities.

How is it measured?

Methodology overview

The term material footprint for household consumption was established by Lettenmeier et al. (2009) and it is based on the MIPS (Material Input Per unit of Service) methodology (Schmidt-Bleek, 1993).

MIPS measures the total amount of materials that have been extracted or moved from their original place during the life-cycle of a product or service, accounting for five material categories: abiotic natural resources, biotic natural resources, erosion in agriculture and forestry, water and air constituents.

The lifestyle material footprint sums up the flows of three MIPS categories:

- **Abiotic natural resources** = non-renewable materials, e.g. oil and the material flows behind its exploration;
- **Biotic natural resources** = renewable materials, e.g. plants;
- **Erosion in agriculture and forestry**.

The measurement of the material footprint depends on two variables, investigated across all lifestyle areas:

1. Amount of consumption of a certain product, service or activity, provided in different units depending on the case: kilogram, square metre, kilowatt hour, kilometre, hour, day or unit;
2. Material intensity per unit of the product, service or activity, meaning the total amount of abiotic resources, biotic resources, and erosion in agriculture and forestry used throughout the life-cycle of the unit assessed.

Defining the sustainable level of the lifestyle material footprint

Schmidt-Bleek (1993) suggested that global resource consumption should be halved by 2050 to live within planetary boundaries, aiming for an equal per capita resource use.

Bringezu (2009) applied this rationale to the global use of abiotic resources, biotic resources and erosion, based on global resource use data from 2000 and an expected population of 9 billion people in 2050. This resulted in an estimated equitable sustainable level of material resource use of 10,000 kg per capita per year.

The EU-funded SPREAD Project, led by the CSCP, suggested that approximately 80% of the sustainable level of material resource use, i.e. 8,000 kg per person per year, should be allocated to household-related consumption and comprise the sphere of a lifestyle (SPREAD, 2012a, 2012b; Lettenmeier et al. 2012a, 2014). The other 20% would be designated to public expenditure (e.g. education and defense services), therefore not included in the individual lifestyle decision-making realm.

A sustainable lifestyle material footprint is thus defined at 8,000kg per person per year. Based on human needs and wellbeing requirements, and considering sustainable lifestyle best practices, a feasible allocation of the benchmarked 8,000 kg to different lifestyle areas is proposed as follows: nutrition (3,000 kg per person per year), housing (1,600 kg), mobility (2,000 kg), goods (500 kg) and other purposes (900 kg) (SPREAD, 2012a, 2012b; Lettenmeier et al. 2012a, 2014). The real allocation is flexible and depends on the needs and preferences of each individual and household.

Understanding a lifestyle material footprint

CSCP, along with D-mat ltd., is working in partnership with the WBCSD to analyse consumption trends around the world, measuring where lifestyle impacts are highest and identifying which business improvements and innovations will have the most significant impact. The aim is to support businesses to better understand where they should focus their efforts in order to inspire sustainable behaviour and enable more sustainable lifestyles.

The measurement and analysis of lifestyle impacts and trends are based on the lifestyle material footprint, focusing on current and future business-as-usual country footprints as well as individual footprints to illustrate the diversity of lifestyles within countries.

Official national consumption accounts are the main source of information for the variable 'amount of consumption' across the different lifestyle areas. Complementary sources include databases of reputable international organisations, e.g. Food and Agriculture Organisation (FAO) and Organisation for Economic Cooperation and Development (OECD), and peer reviewed journals.

Building on an in-depth literature review, a database of previously calculated material flows suitable for household consumption, covering a variety of components, was created as the main source of information for the parameter 'material intensity' (Kotakorpi, E. et al., 2008; Mancini, L., 2011; Database from the Wuppertal Institute for Climate, Environment and Energy).

The measurement of the lifestyle material footprint was split into six main lifestyle areas, which are responsible for the largest share of lifestyle-related material consumption (SPREAD 2050, 2012; BIG2050, 2014):

- **Food & Nutrition,** including all the food and drinks consumed. Examples: 1 kg of beef consumption has a material footprint of 46.2 kg; 1 kg of tomatoes has a material footprint of 2.09 kg.

- **Home,** including the housing infrastructure, energy use and direct water consumption, e.g. water for drinking/cooking and personal/home care. Examples: 1 kWh of electricity generated by coal power plants has a material footprint of 8.5 kg; 1 kWh of electricity generated by wind-power has a material footprint of 0.09 kg.

- **Mobility,** including mobility infrastructure and transportation means such as walking and the use of car, bicycle, public and air transport, for both everyday mobility and tourism. Examples: 1 km travelled by car has a material footprint of 2.02 kg/cap; 1 km travelled by plane has a material footprint of 0.4 kg/cap; 1 km travelled by train has a material footprint of 0.29 kg/cap; 1 km travelled by bicycle has a material footprint of 0.05 kg/cap. everyday mobility and tourism;

- **Household goods,** including several products clustered in 7 product groups: electric and electronic appliances, clothing, shoes, cosmetics and personal care, jewellery, furniture and paper products. Example: 1 kg of body lotion has a material footprint of 3.7 kg.

- **Leisure,** including sports, hobbies, cultural and social activities. Example: 1h spent in a fitness centre has a material footprint of 6.14 kg.

- **Other purposes,** e.g. travel accommodation and pets. Example: a cat has an estimated material footprint of 3,000 kg/year.

What is not captured by the lifestyle material footprint?

Emissions

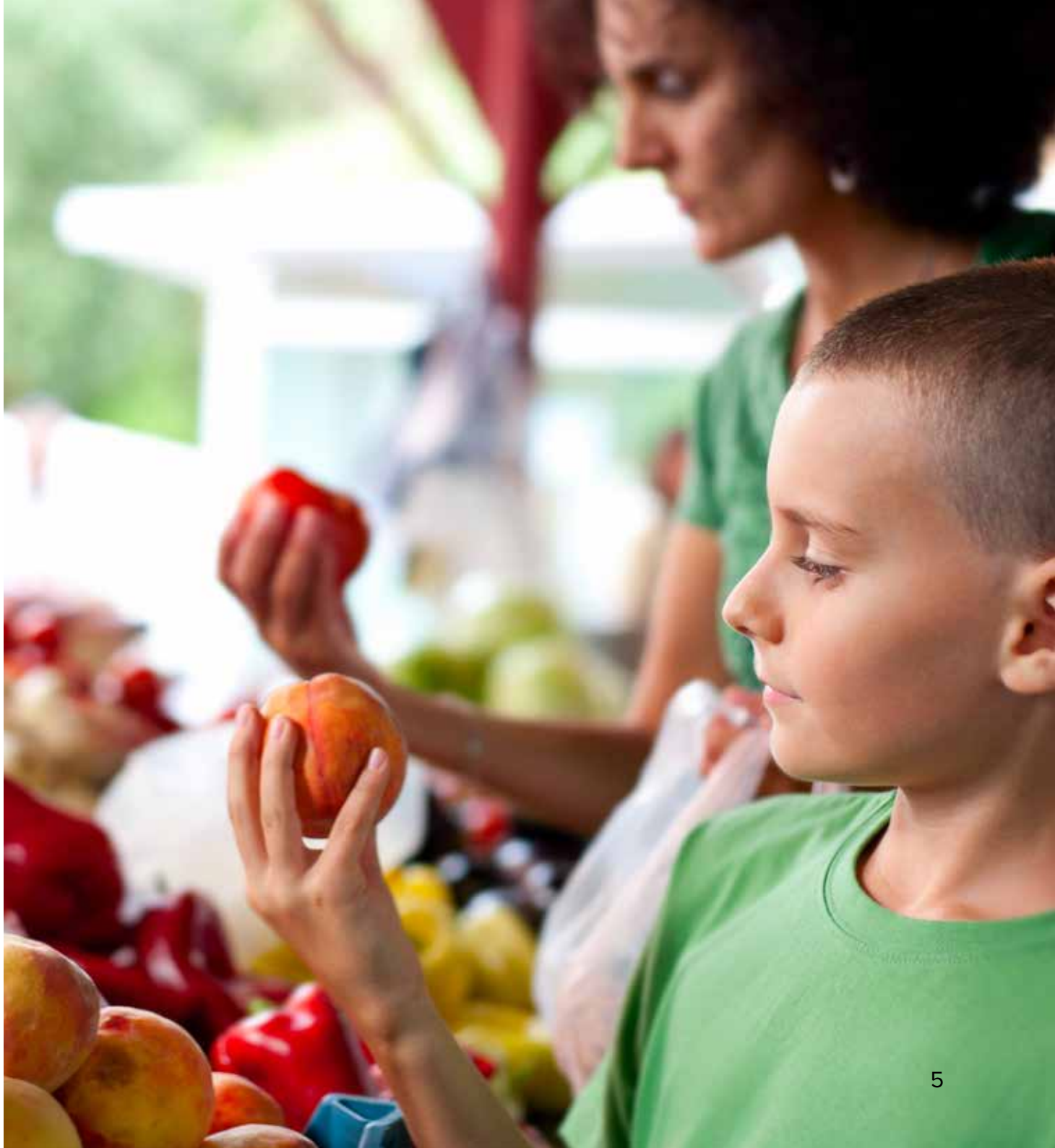
The lifestyle material footprint does not directly measure CO_2 emissions and air pollution. As a preventive sustainability strategy tool, the lifestyle material footprint measures the amount of resource inputs going into the economy, i.e. the resource consumption behind current production and consumption systems. Therefore, emissions and pollution are only accounted for indirectly.

Indirect water use

As explained above, the lifestyle material footprint accounts for direct water consumption by individuals, e.g. water for drinking/cooking and personal/home care. Indirect water use, meaning water needed during the other life-cycle phases of products, services and activities besides the use phase is not included in the measurement.

Toxicity

Potential toxicity and health impacts of the resources consumed are not assessed by the lifestyle material footprint.



Where has the lifestyle material footprint been applied?

The lifestyle material footprint has been applied in different contexts:

Brazil, India, China

CSCP, together with D-mat ltd. and in partnership with the WBCSD analysed lifestyle impacts and patterns in Brazil, India and China by measuring current average material footprints, 2030 business-as-usual footprints and footprint samples of 10 individuals per country (WBCSD Sustainable Lifestyles, 2015b, 2015c, 2015d).

USA

The above project also measured footprint samples of individuals in the USA to illustrate the diversity of lifestyles in developed economies, in order to draw comparisons and exchange learnings (WBCSD Sustainable Lifestyles, 2015a).

Europe

In two projects the material footprint of European households was studied. One was dedicated to the calculation of the material footprint of an average European (Lähteenoja, S. et al., 2008) and the other, led by the CSCP, focused on building scenarios for European sustainable lifestyles of 8,000 kg/year in 2050, as well as calculating the material footprints of individuals in four countries: Finland, Spain, Germany and Hungary (SPREAD 2050, 2012).

Germany

The Wuppertal Institute for Climate, Environment and Energy has calculated the material footprint of 16 German households in the city of Bottrop, Germany (Baedeker, C. et al., 2015).

Finland

Several projects have studied the material footprint of Finnish households (Kotakorpi, E. et al., 2008; Lettenmeier, M., 2012b; Laakso, S.; Lettenmeier, M., 2015).

Country	Average lifestyle material footprint per capita/year	2030 business-as-usual lifestyle material footprint per capita/year
Brazil	11,400 kg	13,200 kg
India	8,400 kg	14,300 kg
China	15,200 kg	24,100 kg
Europe	29,000 kg	-
Finland	40,000 kg	-

What are the main insights gained?

The measurement and analysis of the lifestyle material footprint have enabled the identification of the areas where lifestyle impacts are the highest, as well as the business opportunities with the most potential of achieving significant sustainability gains. This helps companies to prioritise and focus their efforts in order to support more sustainable lifestyles. Complementary data sets (e.g. ecological and carbon footprints) have also been analysed parallel to the analysis of the lifestyle material footprint results, to ensure synergies with other existing tools and a comprehensive outcome.

Key insights derived from the analysis are presented below:

My Lifestyle Material Footprint is affected by...

HOME

The source of electricity we use in our homes, if renewable or non renewable. Coal has the highest footprint of all sources. Also, the bigger our home is, the more materials its infrastructure embeds and the higher the use of electricity and heating is.

Non-renewable Energy — Renewable Energy

Bigger home — Smaller home = less energy

MOBILITY

Our choice of transport, whether we use personal motorized or non motorized transport or public transport, as well as the distance we travel. Moving by car has the highest footprint.

Private Car Use — Public Transport

Long Distances — Non-motorized Transport

FOOD & NUTRITION

The kind of food we eat. Meat has a much higher footprint than other sources of protein, like fish or beans. Vegetables, fruits and grains have relatively low footprints.

Meat Global — Vegetables Local

Logistics Waste — Supply chain Resource efficiency

HOUSEHOLD GOODS

The kind of products we buy, how often and what resources go into them. From personal care to home care, the highest footprint often comes from products containing materials that are mined (metals/jewellery) and where fossil fuels are used in their production.

Mined materials Disposable goods — Eco- materials Recyclable goods

High impact ingredients — Low impact ingredients

What are the methodology challenges?

Up-to-date data

National reports, which are the main sources for assessing the level of consumption per capita across countries, usually have time lags. Therefore, national lifestyle material footprint averages may look smaller than they actually are, especially in rapidly developing countries.

Up-to-date material intensities

The material intensity data used is publically available and, apart from some new technologies, e.g. the production of wind power electricity, not necessarily kept up to date.

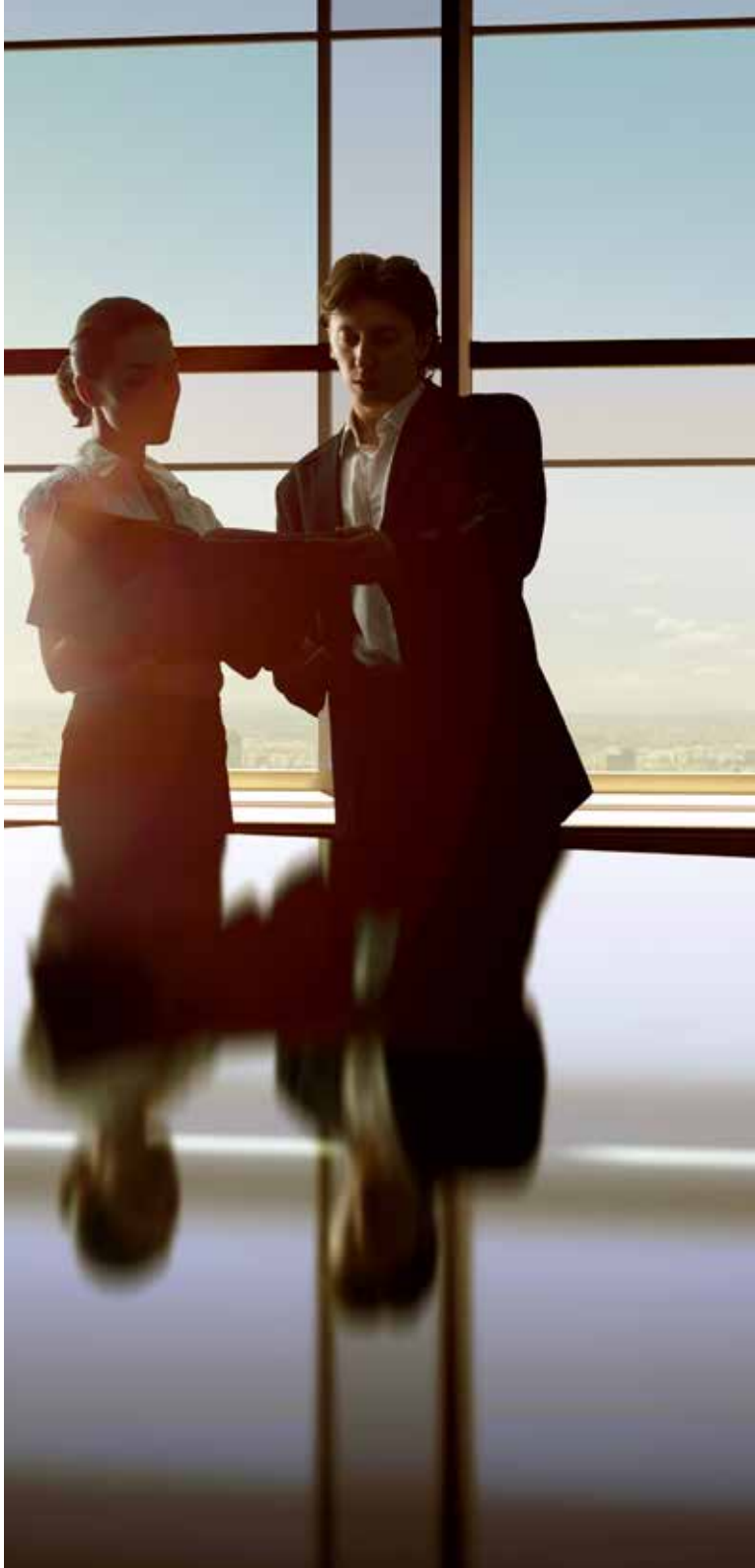
Level of aggregation

National accounts and material flow studies use highly aggregated figures with different levels of detail depending on the economic sector. However, as the goal is to obtain a general direction in which areas lifestyle impacts are most critical and what business solutions are best suited to deliver the greatest positive impacts, such level of aggregation does not inhibit the usefulness of the lifestyle material footprint.

Country specific material intensities

Existing literature on material flows is mostly based on European processes. In cases where no further specific information is available, the assumption is therefore made that production processes outside of Europe have similar material intensities to those taking place in Europe. This may lead to slightly under or over estimations in certain material flows of household consumption outside of Europe.

Other sustainable consumption and production accounting tools also share similar challenges, e.g. the environmentally extended input-output analysis used by European public authorities (Watson, D. et al., 2013), and which are continuously addressed and improved by the academic community in cooperation with other relevant stakeholders. However, the most important issue, namely the identification of critical areas and potential solutions within current lifestyles, is well within the scope of the lifestyle material footprint methodology.



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